

## The Genus *Utaperla*<sup>1</sup>

(Plecoptera : Chloroperlidae)

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The genus *Utaperla* was proposed by Ricker (1952) for a single new western North American species *Utaperla sopladora* Ricker. Recently, while examining some stonefly material from China, it was our good fortune to encounter a species new to science that belongs in this formerly monotypic genus. The discovery of the new species has led the authors to review the genus *Utaperla* in order to more clearly characterize this group.

### UTAPERLA Ricker

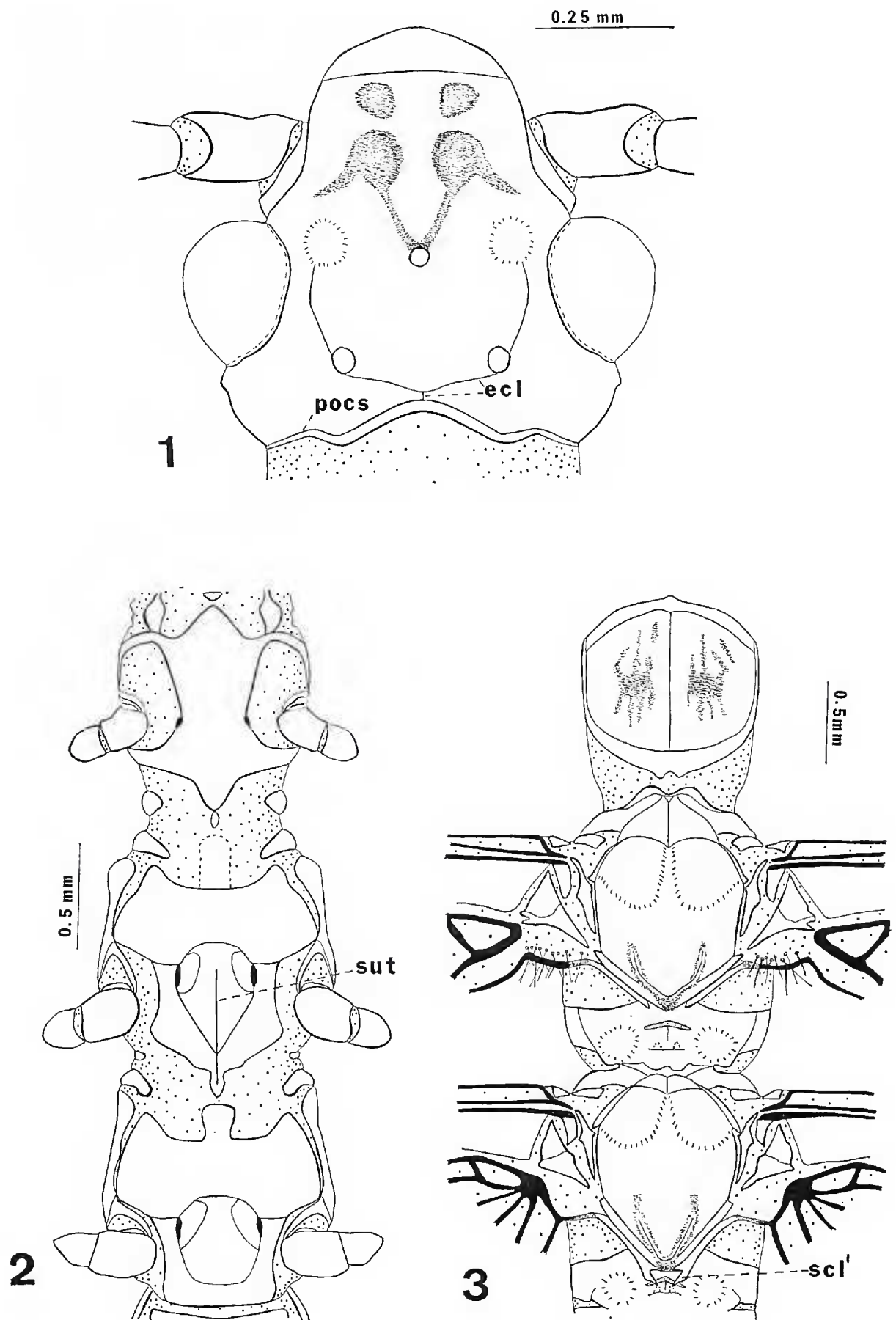
- 1952, *Utaperla* Ricker, Indiana Univ. Publ., Sci. Ser., 18: 174 (*U. sopladora* type species by original designation and by monotypy).  
 1964, Gaufin, Gewasser Abwasser, 34/35: 39.  
 1965, Illies, Annu. Rev. Entomol., 10: 134.  
 1966, Illies Das Tierreich, 82: 428, fig. 19 (distribution map).  
 1966, Gaufin, Nebeker and Sessions, Univ. Utah Biol. Ser., 14 (1): 21, 25, 28, 72.

Ricker (1952) based on his study of *U. sopladora*, placed *Utaperla* within the subfamily Paraperlinae of the Chloroperlidae and characterized it as follows, "The head capsule is slightly elongated, but much less so than in *Paraperla* and there is no straight sided section behind the eyes. The general aspect, in fact, is that of an *Alloperla* of the subgenus *Sweltsa*. However, the basal body of the male supra-anal process is suspended at the anterior edge of the 10th tergite and lies free in the deep median cleft, instead of being attached to the sides of the cleft as in *Alloperla*. On the 7th sternite there is a raised knob, thickly covered by spines. The venation also is much like *Paraperla*, though with fewer crossveins."

Of the preceding characters only those involving the head capsule clearly distinguish *U. sopladora* from the species of other paraperline genera, especially from those of *Paraperla*. The supra-anal process, contrary to Ricker's observation, does not lie free in the median cleft, but is typical of the processes of most stoneflies in that it is held to the hemitergites of the tenth segment by the cowl which attaches to the

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FIGS. 1-3. *Utaperla sopladora* Ricker. FIG. 1. Head, dorsal view. FIG. 2. Thoracic sternum. FIG. 3. Thoracic terga. (ecl = ecdysial cleavage line; pocs = post-occipital suture; sut = mid-ventral suture of mesothoracic furcasternum; scl' = scutellar ridge).

basal lateral sides of the free part (basal body). The slight ventral production of the posterior half of the seventh sternite and its covering of long thick setae are characteristic of the males of *Utaperla* and of *Paraperla frontalis* (Banks). The variational tendencies in the number of wing crossveins of both *Utaperla* and *Paraperla* are great enough to have overlapping ranges so that no crossvein character can be applied consistently enough to distinguish these genera from each other. Gaufin, et al. (1966) use in their key to the genera of Utah Chloroperlidae their observation that *P. frontalis* possesses three or more crossveins in the costal area beyond the subcosta, as opposed to fewer than three in *U. sopladora*. However, their own figure of the wing of *P. frontalis* shows only two crossveins. During this study an examination of available specimens of *P. frontalis* revealed that the number of crossveins in the apical part of the costal area may range from two to four.

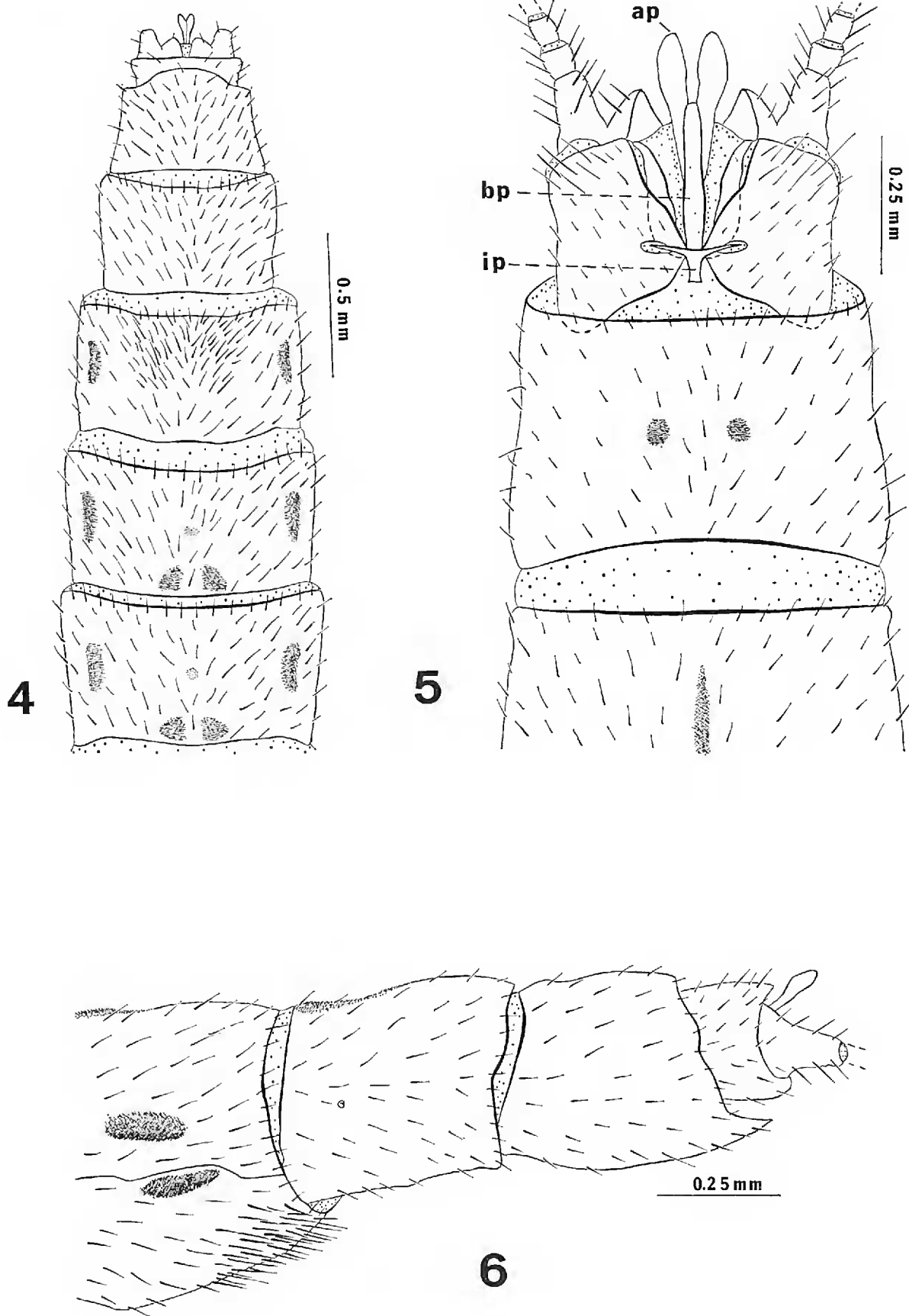
In addition to the above mentioned similarities between *Utaperla* and *Paraperla* it should be mentioned that the coloration, especially the abdominal patterning, of both of these genera is also very closely similar.

At the present time the following unique features appear best for distinguishing *Utaperla* from the other genera in the Paraperlinae. FIRST, the length of the stem of the cranial Y-shaped ecdysial cleavage line (ecl) from the postoccipital suture (pocs) to the arms of the cleavage line is greatly reduced, less than one-fifth the length of each arm extending to the ocellus. Unfortunately, the head and prothorax of the only specimen of the new Chinese species of *Utaperla* had been broken off. Thus, it is not known how similar the head structures of the North American and the Chinese species of *Utaperla* are to each other. However, since both species greatly resemble each other in all observable details, it is fairly certain that the head of this new species will be found to be nearly identical to that of *U. sopladora*. SECOND, the mesothoracic furcasternum (fig. 2) is divided along the mid-ventral line by a suture (sut) which from the spinasternum extends anteriorly to lie between the furcal pits, but it does not reach the sternacostal suture that extends from one furcal pit to the other. THIRD, the metathoracic scutellar ridge (fig. 3 scl') on each side of the insects mid-dorsal line is produced meso-posteriorly into a strongly sclerotized somewhat digitate protrusion bearing a sharply pointed "finger." FOURTH, the male supra-anal process (fig. 6, 10) is apically bifurcate.

#### UTAPERLA SOPLADORA Ricker

(Figs. 1-8)

1952, *Utaperla sopladora* Ricker, Indiana Univ. Publ., Sci. Ser., 18: 174-176, figs. 125 (male terminalia, dorsal), 126 (head and prothorax, dorsal), 127



FIGS. 4-6. *Utaperla sopladora* Ricker. FIG. 4. Male terminalia, ventral view. FIG. 5. Male terminalia, dorsal view. FIG. 6. Male terminalia, lateral view. (ap = apical piece; bp = basal piece; ip = inner part.)

- female terminalia, ventral), 128 (male terminalia, lateral), 129 (wings of male holotype), 130 (wings of female allotype).
- 1955, Gaufin, Proc. Utah Acad. Sci., 32: 120.
- 1959, Jewett, Oreg. State Monogr., Stud. Entomol., 3: 77, figs. 29 e (after Ricker 1952, fig. 125), 29 f (after Ricker 1952, fig. 127).
- 1962, Jewett, Pan-Pac. Entomol., 38 (1): 20.
- 1963, Ricker, Photo Offset, presented to third international symposium on Plecoptera, pp. 14, 15, 19, and distribution map.
- 1964, Gaufin, Proc. Utah Acad. Sci., 41 (2): 225.
- 1964, Gaufin, Gewasser Abwasser, 34/35: 39.
- 1964, Ricker, Gewasser Abwasser, 34/35: 55 and 68, fig. 11 (distribution map).
- 1965, Knight, Nebeker and Gaufin, Entomol. News, 76 (4): 108, fig. 21 (egg, lateral).
- 1966, Nebeker and Gaufin, Entomol. News, 77 (2): 42.
- 1966, Illies, Das Tierreich, 82: 428, fig. 19 (distribution map).
- 1966, Gaufin, Nebeker and Sessions, Univ. Utah Biol. Ser., 14 (1): 12, 17, 19, 21, 72, 75, 77, figs. 2 (after Knight, Nebeker and Gaufin 1965, fig. 21), 203 (head, dorsal), 235 (male terminalia, lateral), 236 (female terminalia, ventral), 238 (male terminalia, dorsal).

Ricker (1952) originally described and figured this species. Gaufin, et al. (1966) recently refigured the head as well as the male and female terminalia of *U. sopladora* and slightly paraphrased the text of Ricker's earlier work. Although both the description of Ricker and the figures of all the above workers are adequate for the recognition of this species, certain critical and fine structural details that might make this species better known have been overlooked. Therefore, it seems that further comment on *U. sopladora* would be useful.

MALE.—Length of the body varies from 5 to 7 mm. Supra-anal process (fig. 5, 7) and its surrounding cowl are situated largely between the tenth hemitergites. The process is composed of two major portions. The very short "inner part" (Smith, 1917) is truncated at its anterior margin and is held to the body by membrane from the tenth segment (fig. 5 ip). From its apex two very thin and sharply pointed lateral braces arise one on each side (fig. 5). The "free part" (Smith, 1917) viewed laterally is hook-shaped and is held to the body by membrane from the cowl which attaches to its basal lateral sides. The free part can be further divided into a single basal piece (bp) and two apical pieces (ap). The basal piece extends from the lateral braces and is a long slender sclerite bearing a bluntly rounded apical margin. The two apical pieces arise one on each side from the lateral apical margins of the basal piece and each is a narrow sclerite which dorso-apically becomes slightly expanded. It is possible that the apical pieces may have been derived from "lateral stylets" such as those associated with the supra-anal process of *P. frontalis*. The cowl of the tenth segment is com-

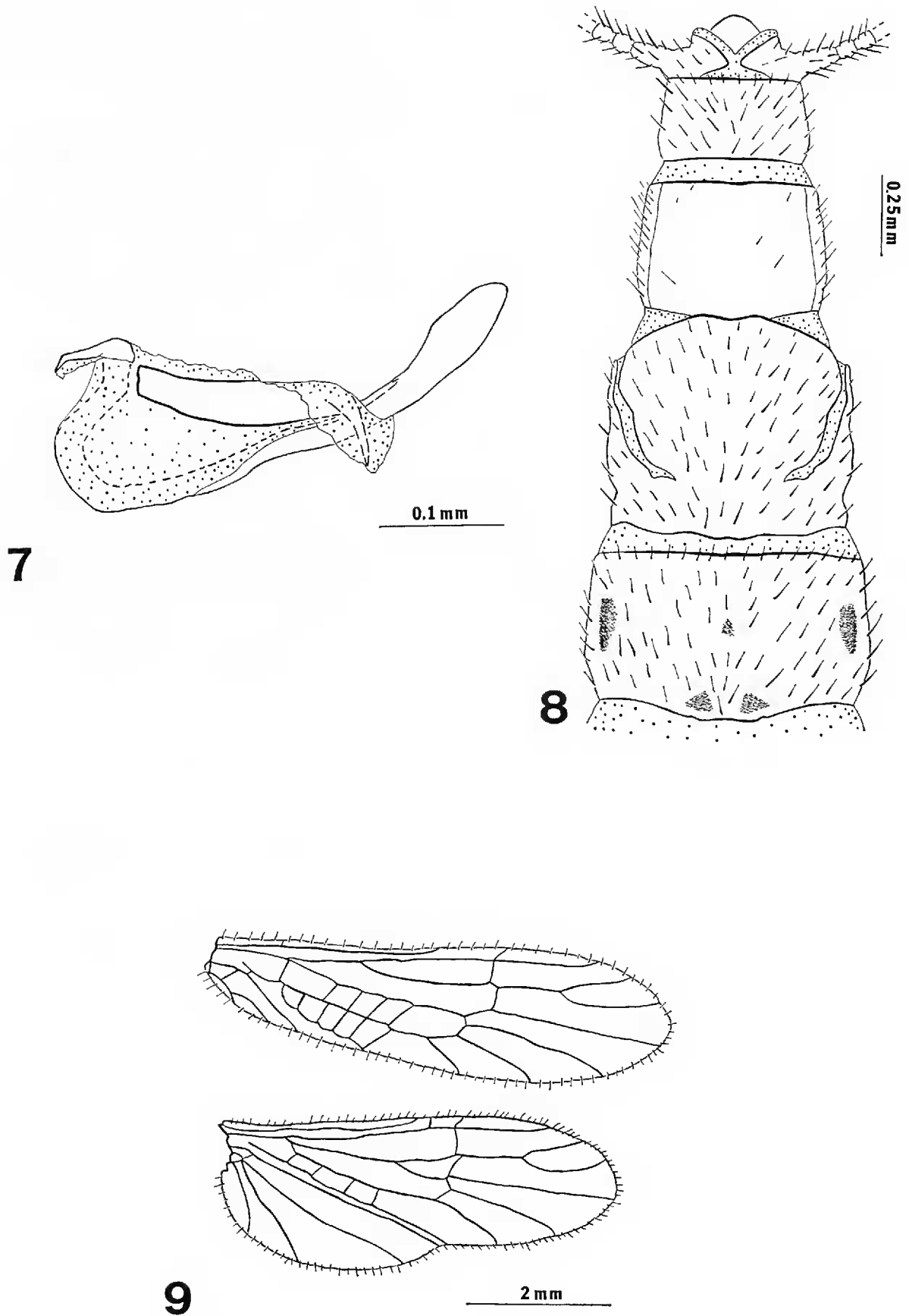


FIG. 7. *Utaperla sopladora* Ricker, male supra-anal process, lateral view. FIG. 8. *Utaperla sopladora* Ricker, female terminalia, ventral view. FIG. 9. *Utaperla orientalis* Nelson and Hanson, wings.

posed of membrane and two distinct paragenital plates. Ricker (1952) mistakenly thought that the paragenital plates were the darkly sclerotized inner mesal margins of the hemitergites. However, close examination of this area reveals that these plates are separated from the true inner mesal margin of each hemitergite by a thin strip of membrane.

**FEMALE.**—Length of the body varies from 6 to 8 mm. Subgenital plate (fig. 8) extending over the anteriormost portion of the ninth sternite, with posterior margin convex. The specimens examined during this study conform with Ricker's figure of the allotype in having a slight median emargination in the posterior margin of the subgenital plate. No such emargination is shown in the figures of female terminalia of *U. sopladora* by Gaufin, et al. (1966), thus this characteristic may be variable.

**MATERIAL EXAMINED.**—10 males, 7 females, North fork of 12-mile creek, Steese Highway, milepost 94, Alaska, 11 July 1952 (C. P. Alexander, M. E. Smith, D. L. Carson); 1 male, Chatanika River, Steese Highway, milepost 39, Alaska, 10 July 1952 (D. L. Carson); 1 male, Alaska Highway, milepost 413, British Columbia, Canada, 26 June 1954 (M. E. Smith); 1 male, Alaska Highway, milepost 430, British Columbia, Canada, 27 July 1954 (C. P. Alexander); 1 male, Mendeltna Creek, Glen Highway, Alaska, 8 August 1954 (C. P. Alexander). Of the preceding material 5 males and 3 females of the "North fork" collection are in the C. H. Nelson collection, the remaining material is in the J. F. Hanson collection.

### ***Utaperla orientalis* Nelson and Hanson, new species**

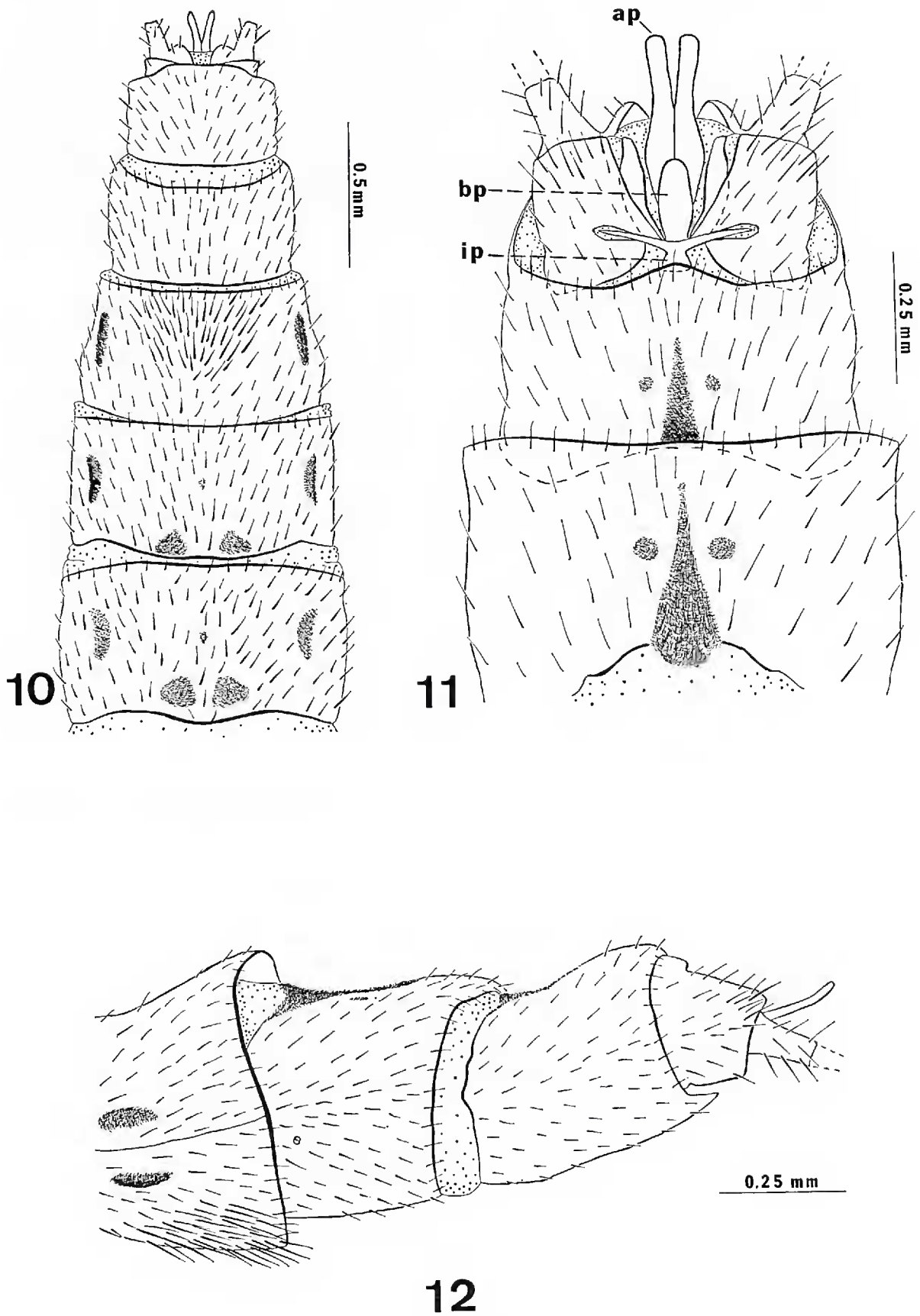
(Figs. 9–12)

Only one specimen of this species, a male, is known. The important differences by which *U. orientalis* can be distinguished from *U. sopladora* concern the supra-anal process (see figs. 4–7, 10–12): (1) the sharp pointed lateral braces of *U. orientalis* are much the larger and more distinct; (2) the basal piece of the hook-shaped free part is much the broader and shorter in *U. orientalis*; (3) the apical pieces of *U. orientalis* are broad basally, become narrower apically and are more heavily sclerotized as well as longer than those of *U. sopladora*. In all other morphological details *U. orientalis*, with the possible exception of the missing head and prothorax, is nearly identical to *U. sopladora*.

**Holotype Male.**—YALU STATION, ALTITUDE 2200 FEET, GREATER KHINGAN MOUNTAINS, MANCHURIA, CHINA, July 1940 (M. A. Weymarn). The type will be retained in the collection of the senior author.

#### DISTRIBUTION OF UTAPERLA

The present known distribution of *U. sopladora* is from Alaska to Utah and within this range this species is closely associated with the



FIGS. 10-12. *Utaperla orientalis* Nelson and Hanson. FIG. 10. Male terminalia, ventral view. FIG. 11. Male terminalia, dorsal view. FIG. 12. Male terminalia, lateral view. (ap= apical piece; bp = basal piece; ip= inner part.)



Rocky Mountains. Ricker (1963, 1964) speculated that during the Pleistocene glaciation *U. sopladora* was confined in the ice-free areas of Yukon River Valley and as the ice melted this species moved southward from its unglaciated refuge. Ricker considered the north to south movement of *U. sopladora* more likely than a south to north one since this species lacks close relatives in southwestern North America and becomes rarer in the southern part of its range. The discovery of closely related *U. orientalis* in the Greater Khingan Mountains of China lends additional support to Ricker's conjecture concerning the dispersal of *U. sopladora*.

Quite possibly, to expand slightly upon Ricker's thinking, during the Pleistocene glaciation the progenitor species of *U. sopladora* and *U. orientalis* took refuge either in the unglaciated areas of northwestern North America or those of northeastern Siberia. This ancestral species subsequently divided, conceivably, into two populations, one of which, *U. orientalis*, extended southward into Asia, and the other, *U. sopladora*, extended southward in North America. However, any more secure conclusion concerning the distribution and origin of *Utaperla* will have to wait until more information on the range of both species, especially that of *U. orientalis*, and on the probability of the existence of more species belonging to this genus is available.

#### ACKNOWLEDGMENTS

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